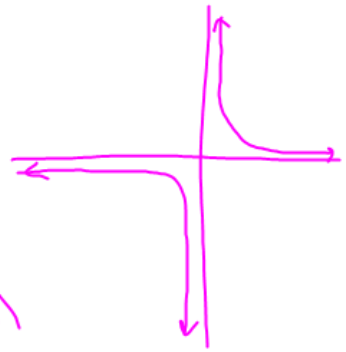
#20

$f(x) = \frac{2}{x}$

$f(x+h) = \frac{2}{x+h}$

$\lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$



$\lim_{h\to 0} \frac{\frac{2}{x+h} - \frac{2}{x}}{h} \cdot \frac{(x+h)}{(x+h)} \Rightarrow \frac{\frac{2x - 2(x+h)}{x(x+h)}}{h}$

$\frac{\frac{2x - 2x - 2h}{x(x+h)}}{h} \Rightarrow \frac{-2h}{x^2+xh} \cdot \frac{1}{h} \Rightarrow -\frac{2h}{x^2h + xh^2}$

$\lim_{h\to 0} -\frac{2}{x^2+xh} \Rightarrow \frac{-2}{x^2} \Rightarrow \frac{-2}{a^2}$

- slope is always neg.
- very steep around zero
- flat away from zero

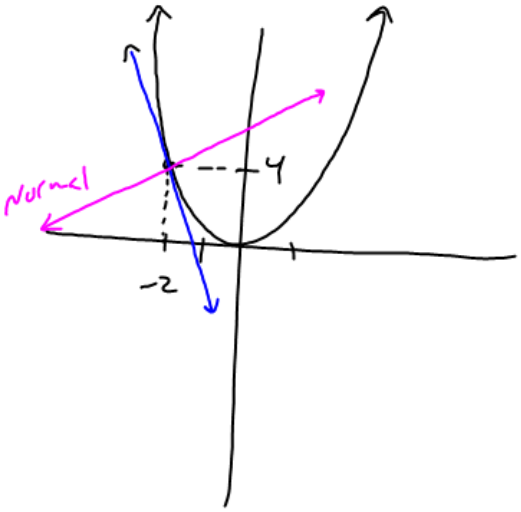
(9)

$f(x) = x^2$

$f(x+h) = (x+h)^2$

$$\lim_{h \to 0} \frac{(x+h)^2 - (x)^2}{h}$$

$$\frac{x^2 + 2xh + h^2 - x^2}{h} \Rightarrow \frac{2xh + h^2}{h} = \lim_{h \to 0} 2x + h$$



(a) $= 2x$

$= 2(-2) = -4$

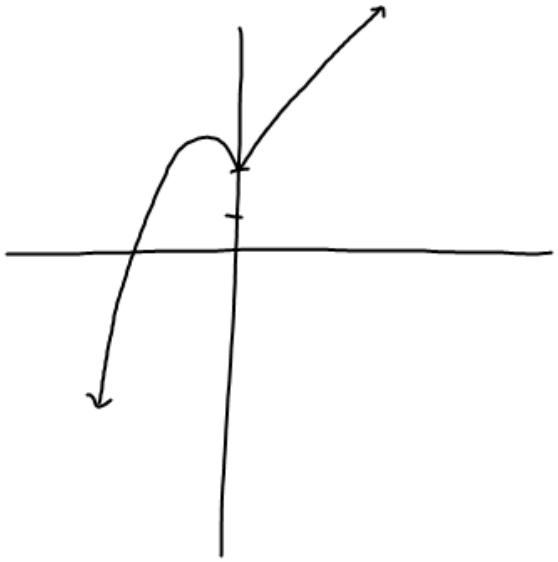
(b) $y = m(x - x_1) + y_1$

$y = -4(x+2) + 4$

(c) $y = \frac{1}{4}(x+2) + 4$

#15)

$$f(x) = \begin{cases} 2-2x-x^2, & x < 0 \\ 2x+2, & x \geq 0 \end{cases} \quad \text{at } x=0$$



$$\lim_{x \to 0} f(x) = 2$$

Slope of tangent $x \to 0^-$

$m = -2$

Slope of tangent $x \to 0^+$

$m = 2$

Slope at $x=0$ doesn't exist

Test - Everything

Limits

- One vs. two-sided
- Properties p.61
- reasoning through $\lim_{x \to 0^+} \frac{1}{x}$
- Solving graphically
- Solving numerically
- Solving algebraically
  - → remember substitution
    $\lim_{x \to 3} x^2 + 2x - 3 = (3)^2 + 2(3) - 3$
  - → with $\sqrt{\ }$ remember conjugates
    $\frac{\sqrt{x+3} - 2}{2} \cdot \frac{\sqrt{x+3} + 2}{\sqrt{x+3} + 2}$
- infinite limits
  $\lim_{x \to 0^+} \frac{1}{x} = \infty$
- asymptotes

Continuity

- 3 part definition
  - $f(c)$ exists
  - $\lim_{x \to c} f(x)$ exists
  - $\lim_{x \to c} f(x) = f(c)$
- Diff. between a continuous function and continuous over an interval or at a pt.
- Removable vs. non-rem. discontinuity
- compositions p.82
- Intermediate Value Thm.

Misc

- end behavior

In General

in class
- 1st → 1 page non calc part
- 2nd → 1 page calc part

home
- 3rd → 1 page calc take home part

⇒ Explain work / thinking → show me how smart you are

Ch. 2 Review

→ Do what you need to do

→ Law it in